

RELATION BETWEEN COMMUTER AND EXPOSURE TO POLLUTION RELATED TO TRAFFIC IN BARCELONA.

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Background and Aim: Travel microenvironments contribute to the highest non-occupational exposure levels encountered for many city-dwellers, due to proximity to the traffic source. Most travel exposure studies have been conducted in northern Europe. Barcelona, a city with amongst the highest car density in Europe, many street canyons, and bike lanes situated predominately on high traffic roads, presents an interesting field for assessing exposures across modes. We present results from a measurement campaign comparing travel by car, bus, bike, and on foot in Barcelona.

Methods: 86 trips were monitored between May and June of 2009 to measure five pollutants related to traffic: Black Carbon (BC) using a micro-aethalometer (Magee), Ultra Fines (UF) using CPC 3007 and P-TRAK, Carbon Monoxide (CO) and Carbon Dioxide (CO₂) using a Q-TRAK, Particulate Matter of 2.5 µm (PM_{2.5}) using a Dust-Trak. At each of these trips there were different combinations of commuting (combining walking, bike, bus and car); route (two routes with two directions each one); and day period (four periods along the day).

Results: Car trips showed the highest exposure concentration for most pollutants (all except CO where bus riders showed the highest values), followed by bus riders, cyclist and pedestrians. Walking trips showed the lowest values of CO₂ (474 ppm) and UF (43986 µg/cm³) and bike trips showed lowest values of CO (0.6 ppm). No differences were found between the routes followed, while differences by period of the day were found, except for CO. Using adjusted models to investigate the factors that could affect the levels of air pollution, we observed that temperature was associated to CO₂, and Wind Speed to UF measured by CPC.

Conclusions: In Barcelona, people using the car were the most exposed to traffic related air pollutants, while those walking were the least exposed.